

products. The following are suggestive of some of these relationships and spillovers:

- Scale economies in semiconductor production are more readily attainable in the presence of high volume demand from the consumer electronics sector;
- To the extent that common production processes are used, the cost of semiconductors for other uses will be lower as a result of the high volume demand from the consumer products sector;
- The cost of R&D for a wide range of applications can be amortized across the consumer electronics driven base;
- The fairly stable demand for consumer electronics products can provide insulation from the more volatile demand for semiconductors from other sectors;
- There appear to be both economies of vertical integration and economies of scope;
- Vertically integrated firms can use revenues from the consumer products and semiconductor lines to contribute to development of new processes and new products both upstream and downstream;
- High volume production of semiconductors gives rise to "learning" economies which increase the proportion of circuits that function, thereby driving down the average cost and price of salable output;

These relationships indicate the nature of some of the linkages that exist in the network of information markets and industries. The point here is not to detail those relationships, but to establish that the development of a US market for ATV products will have important collateral effects spread throughout the electronics and information industries complex.

## **VI. CONCLUSION**

The potential wealth that may be generated in world markets for ATV products over the next twenty years is astounding. Whether and to what extent that potential will be realized in ways consistent with US interests is an open question.

The details of the scenarios do not really matter. Under a broad range of alternative assumptions, the scenarios imply that future development of this technology may offer both enormous opportunity and significant risk to US interests. This

conclusion holds even if the technology develops only at a fraction of the pace and replicates only partially the success of its consumer electronics predecessors.

The scenarios also make clear that our technological and economic futures cannot be separated from each other or insulated from the consequences of US government policies and implementation.

What various agencies of the US government do, or do not do, will have an immense effect on the distribution of world technological, economic and political power created by this family of technologies during the next twenty years and beyond.

These results do not, standing alone, imply that the government should or should not take any particular steps in the processes now under way to develop this family of technologies.

However, viewed in the broader context of challenges to US technological leadership in microelectronics and electronics products more generally, the potential magnitude of the stakes involved in the consumer electronics sector testifies to the importance of a careful review of federal policies, programs, and regulations which influence the incentives of potential US participants.

## NOTES

1. For a good summary see Federal Communications Commission, Notice of Inquiry in the Matter of Advanced Television Systems and Their Impact on the Existing Broadcast Service, MM Docket No. 87-268; Released: August 20, 1987. Also, Comments of William F. Schreiber, Document 3: Analysis and Recommendations, Response to the Notice of Inquiry in MM Docket No. 87-268.
2. For an excellent summary review of the technical and qualitative parameters of the various systems, see Schreiber, Document 3, pp. 3-10.
3. Comments of NHK--The Japan Broadcasting Corporation, MM Docket 87-268, p. 10.
4. Notice of Inquiry in the Matter of Advanced Television Systems and Their Impact on the Existing Broadcast Service, MM Docket No. 87-268; Released: August 20, 1987.
5. Michael E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors (New York: Macmillan Publishing Co., 1980), ch. 10.
6. Estimates provided by the National Telecommunications and Information Administration.
7. For an extensive discussion of the process of "diffusion" see, Everett M. Rogers, Diffusion of Innovations (New York: Macmillan Publishing Co., 1983).
8. There are now approximately 90 million US households with growth expected at about 1.5% per year. The 1% household penetration volumes are based on this growth path.
9. This history is extensively developed in Hugh M. Beville, Jr., "The Product Life Cycle Theory Applied to Color Television" (MBA diss., New York University, 1966). See also, James E. Millstein, "Decline in an Expanding Industry: Japanese Competition in Color Television," in American Industry in International Competition: Government Policies and Corporate Strategies, eds. John Zysman and Laura Tyson (Ithaca: Cornell University Press, 1983), 106-141.
10. NHK COMMENTS, p.10.
11. Data in this section were taken, unless otherwise noted, from various tables in 1987 Electronic Market Data Book, EIA Marketing Services Department (Washington, DC: Electronic Industries Associations: 1987).

12. Karen G. Glenn and William E. Glenn, "Testimony of the New York Institute of Technology," October 8, 1987, before the House Subcommittee on Telecommunications and Finance of the Committee on Energy and Commerce, pp. 12-13.
13. James Martin, Future Developments in Telecommunications, 2nd ed. (Edgewood Cliffs: Prentice-Hall Inc., 1977), p.11.
14. Arthur D. Little, Consumer Electronics: A \$40-Billion American Industry (Washington, D.C., Electronics Industries Association/Consumer Electronics Group, April 1985).
15. 1987 Electronic Market Data Book.
16. MacIntosh Yearbook of World Electronics Data-1988-Japan, vol. II, (BENN Electronics).
17. Thomas R. Howell, William A. Noellert, Janet H. MacLaughlin, and Alan Wm. Wolff, The Microelectronics Race--The Impact of Government Policy on International Competition, (Boulder and London: Westview Press, 1988); Michael Borrus, James E. Millstein, and John Zysman, "Trade and Development in the Semiconductor Industry: Japanese Challenge and American Response," in American Industry in International Competition: Government Policies and Corporate Strategies, eds. John Zysman and Laura Tyson (Ithaca: Cornell University Press, 1983), 142-248. Michael Borrus, Laura D'Andrea Tyson, and John Zysman, "Creating Advantage: How Government Policies Shape Trade in the Semiconductor Industry," in Strategic Trade Policy and the New International Economics, ed. Paul R. Krugman (Cambridge: The MIT Press, 1987), 91-114.
18. International Competitiveness in Electronics (Washington, D.C.: U.S. Congress, Office of Technology Assessment, OTA-ISC-200, November 1983), 463.
19. "Trade and Development in the Semiconductor Industry", 143.
20. Quoted in The Microelectronics Race, 7.
21. Office of the Undersecretary of Defense for Acquisition, Report of Defense Science Board Task Force on Defense Semiconductor Dependency (February 1987) (Washington, D.C., DTIC File Copy, AD-A178 284), 1-2.
22. Ibid.



APPENDIX - A

**UNITED STATES DEPARTMENT OF COMMERCE**  
**The Assistant Secretary for Communications**  
**and Information**  
Washington, D.C. 20230

December 24, 1987

Mr. Alex Felker  
Chief  
Mass Media Bureau  
Federal Communications Commission  
1919 M Street, N.W.  
Washington, D.C. 20554

Dear Lex,

High Definition Television

It is my pleasure to be serving with you on the FCC Advisory Committee on Advanced Television Systems. Chairman Patrick has initiated a process which I hope will end with a U.S. strategy on the future of advanced television in this country. I applaud him for this initiative.

Some months ago, the National Telecommunications and Information Administration held a conference on advanced television. We did so for several reasons. We wanted to get senior leadership more involved with this public policy issue. We wanted to seek advice on developing an advanced television policy for this Administration. And, as a part of the Department of Commerce, we wanted to begin an assessment of the economic implications of technological advancements in high resolution technology in a number of markets, including consumer electronics.

We were most appreciative that you participated in our conference. We, therefore, want to share with you some of the views that are, in part, an outgrowth of the conference.

We believe a primary goal of any initiative should be to make HDTV feasible for terrestrial broadcasting. We have come to this view, not because we favor broadcasting over other video distribution systems, but because unlike such other systems (e.g. Cable and VCR), terrestrial broadcasting is uniquely constrained by government regulations from readily adopting this new technology. The FCC's existing spectrum allocation scheme for television and related technical standards raise issues which must be accommodated if HDTV technology is to be adapted to the broadcast medium and government action will be required. VCR manufacturers and cable companies are not so constrained and can, through wire-lines which they control, reconfigure their spectrum at will. Terrestrial broadcasting is not so fortunate.

Additionally, while important, our concern is not limited to broadcasting being at a unique, government-driven disadvantage in responding to the HDTV opportunity. We also feel that the federally fostered local television system will be needlessly jeopardized if steps toward making HDTV feasible for terrestrial broadcasting are not taken. The video market is most competitive when, as is the case today, state-of-the-art technology is used by all media. It is not easy to maintain competition in the marketplace, however, if there are marked technical quality differences among competitors. If terrestrial broadcasting cannot accommodate the new technology, it almost certainly risks being left behind by competing video delivery systems able to provide high definition service. We believe that local television, with its strong traditional commitment to local news and other service, should not be put at risk of a prolonged decline, much in the way that the AM radio was allowed to decline vis-a-vis higher quality FM service.

In our view, the FCC's Advanced Television study should result in the commencement of a rule making proceeding, which would declare as its intention, the establishment of an HDTV broadcast transmission standard by a specific date. We have suggested 1991 as an appropriate target. At least four important benefits should flow from the selection of a single HDTV broadcast transmission standard. First, given the substantial progress that has already been made toward creating an HDTV system suitable for terrestrial broadcasting, three years afford sufficient time for further innovation. Second, by announcing a target date, the Commission will serve notice on firms engaged in development of HDTV that our terrestrial broadcast media will deliver HDTV, and will deliver it in about the same timeframe as other media. Third, consumers will be given the same sort of assurance that terrestrial broadcasting will be part of the HDTV future. Fourth, terrestrial broadcast television will be given an opportunity to maintain its place as a competitive, state-of-the-art video technology.

We recognize that any Commission standard setting proceeding will involve balancing a number of variables. First, the HDTV broadcast transmission standard must be as spectrum efficient as possible. While we have an open mind on the use of additional bandwidth, a 6 megahertz solution in accord with existing allocations, would clearly be more easily implemented. Additionally, we think it is important that any HDTV system adopted as a transmission standard generate a signal compatible with existing NTSC sets, such

that viewers will be able to receive virtually the same quality of service on existing sets. There will also necessarily be signal quality trade offs between proposed competing HDTV transmission systems. Any final terrestrial broadcast standard for HDTV will have to be evaluated in the light of these factors and achieve the proper balance.

It is also important to understand that by this proposal, we do not mean that the FCC should establish an HDTV transmission standard for any other video distribution systems, or that the Commission should involve itself with standard setting for TV sets or other receiver hardware. We believe an HDTV broadcast transmission standard is the key and set manufacturers can be expected to design sets capable of decoding the broadcast transmission standard ultimately agreed upon.

Our concern is that this process begin; that the Commission announce its determination to set a standard by 1991. Such an announced intention would provide increased certainty and a very real target on which HDTV transmission system designers can fix their sites. Again, this would be a standard for HDTV broadcast transmission only, not more.

Should you be interested, a fuller development of these thoughts is set forth in our comments filed with the FCC in the Advance Television proceeding. I very much look forward to working with you as we seek to meet what I believe is the greatest challenge facing television for the remainder of this century.

Sincerely,



Alfred C. Sikes

cc: Dennis Patrick  
Richard E. Wiley, Esq.